

The listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1) (Currently Amended) A hearing aid for use in ~~A magnetic field modulation system for a cochlear implant surgically implantable into~~ a human ear, the ear consisting in part of an auditory canal, ~~the auditory canal having inserted therein an audio signal processor, switching amplifier and at least one microphone for receiving and processing auditory signals~~ and a middle ear space and having an intact a tympanic membrane disposed therebetween, the ~~magnetic field modulation system~~ hearing aid comprising:

an external portion to be inserted into the auditory canal, the external portion comprising:

at least one microphone to receive sounds and convert the received sounds into electrical sound signals;

an audio signal processor responsive to the electrical sound signals to provide processed electrical sound signals;

a Class D switching amplifier responsive to the processed electrical sound signals to provide a switched electrical sound signal, the switching amplifier having a switching frequency;

[[a]] a transmitting coil to be positioned in said auditory canal adjacently spaced from said tympanic membrane, and connected to the switching amplifier to receive the switched electrical sound signal, the transmitting coil having a low inductance at the switching frequency;
and

a cochlear implant portion surgically implantable into the middle ear space, the cochlear implant comprising:

[[b]] a receiving coil electromagnetically coupled to the transmitting coil to receive the switched electrical sound signal and to provide a coupled switched electrical sound signal, the receiving coil to be positioned in the middle ear adjacently spaced from the tympanic membrane; and

first and second electrodes connected to the receiving coil, the first electrode to be inserted into the cochlea to provide substantially the coupled switched electrical sound signal to

the cochlea, and the second electrode to provide a signal return path for the coupled switched electrical sound signal

~~e) said transmitting coil having a constant thickness and a diameter derived from the space separating said receiving coil and said transmitting coil;~~

~~d) said transmitting coil receiving auditory signals from said switching amplifier, said transmitting coil electromagnetically coupling said received audio signals to said receiving coil; and~~

~~e) means connected to said receiving coil for demodulating and transmitting said electromagnetically coupled audio signals to the cochlea.~~

2) (Currently Amended) The hearing aid ~~magnetic field modulation system~~ of Claim 1, wherein said transmitting coil is matched to the switching amplifier such that the transmitting coil operates in synchronization with the switching frequency of the switching amplifier.

3) (Currently Amended) The hearing aid ~~magnetic field modulation system~~ of Claim 1, wherein the switching amplifier has an output and said transmitting coil is ~~matched to the switching amplifier such that the coil operates~~ coupled directly to the amplifier output outputs.

4) (Currently Amended) The hearing aid ~~magnetic field modulation system~~ of Claim 1, wherein said transmitting coil's position is axially aligned with the position of said receiving coil.

5) (Currently Amended) The hearing aid ~~magnetic field modulation system~~ of Claim 1, wherein said receiving coil's position is angularly disposed to said transmitting coil's position.

6) (Currently Amended) The hearing aid ~~magnetic field modulation system~~ of Claim 1, wherein the spacing between said transmitting coil and said receiving coil is from about 1 mm to about 7 mm.

7) (Currently Amended) ~~The magnetic field modulation system of Claim 1, A~~ magnetic field modulation system for a cochlear implant surgically implantable into a human ear, the ear consisting in part of an auditory canal, the auditory canal having inserted therein an audio signal processor, switching amplifier and at least one microphone for receiving and processing auditory signals and a middle ear space having a tympanic membrane disposed therebetween, the magnetic field modulation system comprising:

a) a transmitting coil positioned in said auditory canal adjacently spaced from said tympanic membrane;

b) a receiving coil positioned in the middle ear adjacently spaced from the tympanic membrane;

c) said transmitting coil having a constant thickness and a diameter derived from the space separating said receiving coil and said transmitting coil;

d) said transmitting coil receiving auditory signals from said switching amplifier, said transmitting coil electromagnetically coupling said received audio signals to said receiving coil; and

e) means connected to said receiving coil for demodulating and transmitting said electromagnetically coupled audio signals to the cochlea;

wherein said receiving coil comprises:

[[a]] b1) a first C-shaped coil;

[[b]] b2) a second C-shaped coil juxtaposition said first C-shaped coil;

[[c]] b3) a pair of spaced apart transfer bridges connectively disposed to said first and said second C-shaped coil's open end points; and

[[d]] b4) means for operationally connecting said transfer bridges together thereby securing said receiving coil within the confines of the middle ear.

8) (Currently Amended) ~~The magnetic field modulation system of Claim 1, A~~ magnetic field modulation system for a cochlear implant surgically implantable into a human ear, the ear consisting in part of an auditory canal, the auditory canal having inserted therein an audio signal processor, switching amplifier and at least one microphone for receiving and processing auditory

signals and a middle ear space having a tympanic membrane disposed therebetween, the magnetic field modulation system comprising:

a) a transmitting coil positioned in said auditory canal adjacently spaced from said tympanic membrane;

b) a receiving coil positioned in the middle ear adjacently spaced from the tympanic membrane;

c) said transmitting coil having a constant thickness and a diameter derived from the space separating said receiving coil and said transmitting coil;

d) said transmitting coil receiving auditory signals from said switching amplifier, said transmitting coil electromagnetically coupling said received audio signals to said receiving coil; and

e) means connected to said receiving coil for demodulating and transmitting said electromagnetically coupled audio signals to the cochlea;

wherein said receiving coil comprises:

[[a]] b1) a C-shaped hub;

[[b]] b2) a C-shaped dual lobe receiving coil;

[[c]] b3) said C-shaped dual lobe receiving coil being slidably insertable into said C-shaped hub; and

[[d]] b4) means for operationally securing said C-shaped hub and C-shaped dual lobe receiving coil thereby securing said receiving coil within the confines of the middle ear.

9) (Currently Amended) The ~~hearing aid magnetic field modulation system~~ of Claim 1, ~~wherein said means connected to said receiving coil for demodulating is~~ wherein the cochlear implant portion further comprises a capacitor operationally disposed functionally connected to said receiving coil to perform at least one of to match the inductance of the receiving coil to the switching frequency or to demodulate the coupled switched electrical sound signal to be provided to the cochlea.

10) (Canceled)

11) (New) The hearing aid of claim 1 wherein the switching amplifier has a switching frequency of approximately 2 MegaHertz.

12) (New) The hearing aid of claim 1 wherein the transmitting coil and the receiving coil together act as a transformer with a low inductive impedance at the switching frequency.

13) (New) The hearing aid of claim 1 wherein the transmitting coil comprises a plurality of turns of 30 to 60 AWG wire.

14) (New) The hearing aid of claim 1 wherein the transmitting coil comprises 100 to 500 turns of 30 to 60 AWG wire.

15) (New) The hearing aid of claim 1 wherein the receiving coil comprises a plurality of turns of 40 to 60 AWG wire.

16) (New) The hearing aid of claim 1 wherein the receiving coil comprises 1500 to 3000 turns of 40 to 60 AWG wire.

17) (New) The hearing aid of claim 1 wherein said transmitting coil has a constant thickness and a diameter derived from the space separating said receiving coil and said transmitting coil.

18) (New) A hearing aid external portion for use in a human ear and for use with a cochlear implant portion, the ear consisting in part of an auditory canal and a middle ear space and having a tympanic membrane disposed therebetween, the hearing aid external portion to be inserted into the auditory canal, the cochlear implant portion being surgically implantable into the middle ear space and having a receiving coil, the hearing aid external portion comprising:

at least one microphone to receive sounds and convert the received sounds into electrical sound signals;

an audio signal processor responsive to the electrical sound signals to provide processed electrical sound signals;

a Class D switching amplifier responsive to the processed electrical sound signals to provide a switched electrical sound signal, the switching amplifier having a switching frequency; and

a transmitting coil to be positioned in said auditory canal adjacently spaced from said tympanic membrane, and connected to the switching amplifier to receive the switched electrical sound signal, the transmitting coil having a low inductance at the switching frequency, the transmitting coil to be electromagnetically coupled to the receiving coil.

19) (New) The hearing aid of claim 18, wherein said transmitting coil is matched to the switching amplifier such that the transmitting coil operates in synchronization with the switching frequency of the switching amplifier.

20) (New) The hearing aid external portion of claim 18 wherein the switching amplifier has a switching frequency of approximately 2 MegaHertz.

21) (New) The hearing aid of claim 1 wherein the receiving coil has a thickness of approximately 1 millimeter.

22) (New) The hearing aid of claim 1 wherein the receiving coil has a diameter of approximately 3 to 4 millimeters.

23) (New) The hearing aid of claim 1 wherein the transmitting coil has a thickness of approximately 1 millimeter.

24) (New) The hearing aid of claim 1 wherein the transmitting coil has a diameter of approximately 3 to 4 millimeters.

25) (New) The hearing aid external portion of claim 18 wherein the transmitting coil has a thickness of approximately 1 millimeter.

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26) (New) The hearing aid external portion of claim 18 wherein the transmitting coil has a diameter of approximately 3 to 4 millimeters.